

Claims

- [c1] An electrostatic wafer holding apparatus, comprising:
an electrostatic chucking pedestal;
a bi-directional backside conduit in fluid communication with a backside of said chucking pedestal;
said bi-directional backside conduit in fluid communication with a backside carrier gas supply line; and
said bi-directional backside conduit further in fluid communication with a vacuum supply line.
- [c2] The apparatus of claim 1, further comprising means for selectively coupling said bi-directional backside conduit to one of said backside carrier gas supply line and said vacuum supply line.
- [c3] The apparatus of claim 2, further comprising detection circuitry for detecting a curvature present in a wafer placed on said chucking pedestal.
- [c4] The apparatus of claim 3, wherein said detection circuitry is configured to cause said bi-directional backside conduit to be decoupled from said backside carrier gas supply line and coupled to said vacuum supply line upon said detecting a curvature present in said wafer.

- [c5] The apparatus of claim 4, wherein said detection circuitry is further configured to cause said bi-directional backside conduit to be decoupled from said vacuum supply line and re-coupled to said backside carrier gas supply line upon detecting a desired pressure between said wafer and said chucking pedestal.
- [c6] An electrostatic wafer holding apparatus, comprising:
an electrostatic chucking pedestal having an inner zone and an outer zone;
a bi-directional backside conduit in fluid communication with a backside of said chucking pedestal;
said bi-directional backside conduit in fluid communication with a backside carrier gas supply line; and
said bi-directional backside conduit further in fluid communication with a vacuum supply line;
wherein said inner zone and said outer zone are mechanically decoupled from one another.
- [c7] The apparatus of claim 6, further comprising means for selectively coupling said bi-directional backside conduit to one of said backside carrier gas supply line and said vacuum supply line.
- [c8] The apparatus of claim 7, further comprising detection circuitry for detecting a curvature present in a wafer

placed on said chucking pedestal.

[c9] The apparatus of claim 8, wherein said detection circuitry is configured to cause said bi-directional backside conduit to be decoupled from said backside carrier gas supply line and coupled to said vacuum supply line upon said detecting a curvature present in said wafer.

[c10] The apparatus of claim 9, wherein said detection circuitry is further configured to cause said bi-directional backside conduit to be decoupled from said vacuum supply line and re-coupled to said backside carrier gas supply line upon detecting a desired pressure between said wafer and said chucking pedestal.

[c11] The apparatus of claim 6, further comprising a suitable micro-positioning control mechanism associated with each of said inner and outer zones of said chucking pedestal, wherein a height of said inner and outer zones are independently adjustable with respect to one another.

[c12] The apparatus of claim 11, wherein said outer zone is configured to be in a raised position with respect to said inner zone when a wafer having a positive radius of curvature is placed upon said chucking pedestal.

[c13] The apparatus of claim 12, wherein said inner zone is

configured to be in a raised position with respect to said outer zone when a wafer having a negative radius of curvature is placed upon said chucking pedestal.

- [c14] A method for implementing pressure assisted electrostatic chucking, the method comprising:
placing a wafer onto an electrostatic chucking pedestal;
introducing a supply of backside carrier gas to a backside of said electrostatic chucking pedestal;
monitoring a pressure between said wafer and said electrostatic chucking pedestal to determine whether a threshold level of chucking force exists; and
decoupling said backside carrier gas from said backside of said electrostatic chucking pedestal and coupling said backside of said electrostatic chucking pedestal to a vacuum supply whenever the actual level of chucking force is less than said threshold level of chucking force.
- [c15] The method of claim 14, further comprising introducing a front side supply of gas in conjunction with said vacuum supply.
- [c16] The method of claim 14, further comprising decoupling said vacuum supply from said backside of said electrostatic chucking pedestal and coupling said backside of said electrostatic chucking pedestal to said backside carrier gas whenever the actual level of chucking force

meets said threshold level of chucking force.

[c17] The method of claim 16, further comprising increasing an electrostatic chucking voltage applied to said electrostatic chucking pedestal whenever said coupling of said backside of said electrostatic chucking pedestal to said vacuum supply is insufficient to create said threshold level of chucking force.

[c18] The method of claim 17, further comprising determining a defective wafer condition whenever said coupling of said backside of said electrostatic chucking pedestal to said vacuum supply is insufficient to create said threshold level of chucking force and said electrostatic chucking voltage exceeds a maximum established value thereof.